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10/596,480	02/27/2007	Jorg Beilharz	071308.0733	7106

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EXAMINER	
COLEMAN, KEITH A	
ART UNIT	PAPER NUMBER
3747	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/596,480	BEILHARZ ET AL.	
	Examiner	Art Unit	
	KEITH COLEMAN	3747	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6 and 14-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsuzuki et al. (US Patent No. 5,057,734)

With regards to claims 1, 2, and 14 , the patent to Tsuzuki et al. discloses a method for controlling a valve (7, See Figure 3) with a valve actuating device (piezoelectric mechanism 77), which is provided in the form of a piezo actuator (i.e. piezoelectric element 77), with a valve element (i.e. valve 7), a valve body (1) and a valve seat (i.e. the interior of cavity 1 and orifices 3, See Figure 3), in which the method comprising the steps of: moving at a predeterminable point in time (i.e. in increments of 200 microseconds, See Figure 12) the valve element (7) is moved at a predeterminable point in time from a position in contact with the valve seat (See Figure 12) into a predetermined position away from the valve seat by a discharging process of the piezo actuator (77), dividing the discharging process is divided into a first discharging duration (i.e. cycles through in microseconds, Col. 12, Lines 65-68 through Col. 13, Lines 1-10), during which a predetermined first amount of electrical energy (i.e. 1000 volts to 0 volts,

See Figure 12) is discharged from the piezo actuator (77), a subsequent holding time duration, during which the piezo actuator is not controlled (See Figure 12), and a subsequent second discharging duration, during which a predetermined second amount of electrical energy is discharged from the piezo actuator (77), and dependent on the waveform of a voltage at the piezo actuator which is characteristic of the oscillation behavior of the piezo actuator adapting, during the holding time duration, the holding time duration and/or the first discharging duration is adapted in order to ensure precise control of the valve (i.e. dependent on the LC oscillation circuits, Col. 13, Lines 1-30).

With regards to claims 3 and 15, the patent to Tsuzuki et al. discloses wherein the holding time duration and/or the first discharging duration or the first charging duration is/are adapted dependent on the amplitude and/or the period of the waveform of the variable (i.e. dependent on the piezoelectric actuator and cycles in microseconds and the LC oscillation circuit, See Col. 13, Lines 1-30) which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration (inherent in a LC oscillation circuit).

With regards to claims 4 and 16, the patent to Tsuzuki et al. discloses the holding time duration is adapted dependent on the period of the waveform of the variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration (See Col. 14, Lines 40-55, and See Figure 12).

With regards to claims 5 and 17, the patent to Tsuzuki et al. discloses wherein the first discharging duration or the first charging duration is adapted dependent on the amplitude of the waveform of the variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration (i.e. dependent on equations shown on Col. 12, Lines 30-36).

With regards to claims 6 and 18, the patent to Tsuzuki et al. discloses wherein the sum of the first charging duration and the holding time duration is limited to a maximum value (i.e. modulated in microseconds, Col. 9, Lines 6-15), which ensures that the valve element (20) is still in contact with the valve seat.

Claims 7-13, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuzuki et al. (US Patent No. 5,057,734) in view of Rodriguez-Amaya (US Patent Publication 2002/0113139)

With regards to claims 7, 12, and 19, the patent to Tsuzuki et al. discloses a control unit (See Figure 8), which comprises an outlet duct that is connected hydraulically to the working space (78), the piezo actuator (77) that forms a valve actuating device (See Figures 1 and 8), and the valve (7), whereby the valve comprises a valve element (7), a valve body (i.e. nozzle), a valve seat (i.e. interior of the nozzle shown in Figure 1) , wherein the valve is part of a pump/nozzle device with a pump (i.e. plunger 12 in hole 1) , which has a piston (12) and a working space (11), except

positively disclosing an auxiliary control chamber which is disconnected hydraulically from the outlet duct when the valve element is in contact with the valve seat and which otherwise is connected hydraulically to the outlet duct.

The patent to Rodriguez-Amaya discloses wherein a valve (5) is part of a pump/nozzle device with a pump (2, See Figure 6), which has a piston (2) and a working space (1), an auxiliary control chamber (11 and 12) which is disconnected hydraulically from the outlet duct (3) when the valve element (5) is in contact with the valve seat and which otherwise is connected hydraulically to the outlet duct.

Since both references are concerned with injection phases (See Paragraph 20 from Rodriguez-Amaya et al. and Col. 3, Lines 1-20 from Tsuzuki et al.), it would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide the fuel injector of Tsuzuki et al. with wherein the valve is part of a pump/nozzle device with a pump , which has a piston and a working space, an auxiliary control chamber which is disconnected hydraulically from the outlet duct when the valve element is in contact with the valve seat and which otherwise is connected hydraulically to the outlet duct in view of the teaching to Rodriguez-Amaya, in order to compensate for pressure variations (See Paragraph 2 from Rodriguez-Amaya et al.)

With regards to claims 8, 13, and 20, the combination of Tsuzuki et al. and Rodriguez-Amaya discloses all the limitations of the claimed subject matter including Tsuzuki et al. disclosure of wherein the first discharging duration is limited to a minimum

value (i.e. the controller cycles through in microseconds, See Figure 12), which ensures that the nozzle needle closes the nozzle (See Figure 12).

With regards to claim 9, the combination of Tsuzuki et al. and Rodriguez-Amaya discloses all the limitations of the claimed subject matter including Tsuzuki et al. disclosure of wherein the holding time duration and/or the first discharging duration or the first charging duration is/are adapted dependent on the amplitude and/or the period of the waveform of the variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration (i.e. inherent in a LC oscillation circuit and See Col. 12, Lines 30-40 and Figure 12).

With regards to claim 10, the combination of Tsuzuki et al. and Rodriguez-Amaya discloses all the limitations of the claimed subject matter including Tsuzuki et al. disclosure of wherein the holding time duration is adapted dependent on the period of the waveform of the variable which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration (i.e. inherent in a LC oscillation circuit and See Col. 12, Lines 30-40 and Figure 12).

With regards to claim 11, the combination of Tsuzuki et al. and Rodriguez-Amaya discloses all the limitations of the claimed subject matter including Tsuzuki et al. disclosure of wherein the first discharging duration or the first charging duration is adapted dependent on the amplitude of the waveform of the variable which is

characteristic of the oscillation behavior of the piezo actuator during the holding time duration (i.e. inherent in a LC oscillation circuit and See Col. 12, Lines 30-40 and Figure 12).

Response to Arguments

1. Applicant's arguments filed 12/12/2008 have been fully considered but they are not persuasive.

Applicant's Arguments

Tsuzuki fails to teach at least: a method comprising the steps of dividing the discharging process into a first discharging duration, during which a predetermined first amount of electrical energy is discharged from the piezo actuator, a subsequent holding time duration, during which the piezo actuator is not controlled, and a subsequent second discharging duration, during which a predetermined second amount of electrical energy is discharged from the piezo actuator; and dependent on the waveform of a voltage at the piezo actuator or a current through the piezo actuator which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration, adapting the holding time duration and/or the first discharging duration in order to ensure precise control of the valve. This is naturally so since Tsuzuki concerns only charging of a piezo actuator to avoid bouncing of the valve member 67d. Tsuzuki, column 1, lines 51-53; and column 14, line 66 to column 13, line 21. Consequently, the subject matter of claim 1 is new in view of Tsuzuki.

Turning to independent claims 2 and 14 concerning charging of a piezo actuator, Tsuzuki fails to teach at least: dividing the charging process into a first charging duration, during which a predetermined first amount of electrical energy is fed to the piezo actuator, a subsequent holding time duration, during which the piezo actuator is not controlled, and a subsequent second charging duration, during which a predetermined second amount of electrical energy is fed to the piezo actuator; and dependent on the waveform of a voltage at the piezo actuator or a current through the piezo actuator which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration, adapting the holding time duration and/or the first charging duration in order to ensure precise control of the valve. In Tsuzuki only a first ignition signal S 1 and a second ignition signal $2 effect the closing of the valve. A holding time duration does not effect the closing of the valve and a holding time duration is not adapted. Tsuzuki, column 14, line 66 to column 13, line 21; column 10, lines 28-52; and column 14, lines 40-50. In other words, the method in **Tsuzuki does not adapt a holding time duration dependent on the waveform of a voltage at the piezo actuator or a current through the piezo actuator which is characteristic of the oscillation behavior of the piezo actuator during the holding time duration.** It is noted that the LC oscillation circuits are switched on by the ignition signals S 1 and $2 respectively and this LC oscillation circuit enhances the reduction of the voltage of the piezoelectric element 77. Tsuzuki, column 10, lines 28-52.

Examiner's Response to Arguments

With regards to Applicant's first argument, Tsuzuki et al. discloses a method for controlling a valve (7, See Figure 3) with a valve actuating device (piezoelectric mechanism 77), which is provided in the form of a piezo actuator (i.e. piezoelectric element 77), with a valve element (i.e. valve 7), a valve body (1) and a valve seat (i.e. the interior of cavity 1 and orifices 3, See Figure 3), in which the method comprising the steps of: moving at a predeterminable point in time (i.e. in increments of 200 microseconds, See Figure 12) the valve element (7) is moved at a predeterminable point in time from a position in contact with the valve seat (See Figure 12) into a predetermined position away from the valve seat by a discharging process of the piezo actuator (77), dividing the discharging process is divided into a first discharging duration (i.e. cycles through in microseconds, Col. 12, Lines 65-68 through Col. 13, Lines 1-10), during which a predetermined first amount of electrical energy (i.e. 1000 volts to 0 volts, See Figure 12) is discharged from the piezo actuator (77), a subsequent holding time duration, during which the piezo actuator is not controlled (See Figure 12), and a subsequent second discharging duration, during which a predetermined second amount of electrical energy is discharged from the piezo actuator (77), and dependent on the waveform of a voltage at the piezo actuator which is characteristic of the oscillation behavior of the piezo actuator adapting, during the holding time duration, the holding time duration **and/or** the first discharging duration is adapted in order to ensure precise control of the valve (i.e. dependent on the LC oscillation circuits, Col. 13, Lines 1-30).

With regards to Applicant's second argument, Applicant simply elides over the limitation of **and/or,** which does not require the adapting the holding period to be considered. Applicant is reminded to see MPEP 2111.

Lastly, the specificity found in Applicant's remarks is not found in the claim language. Applicant is reminded to see MPEP 2111. In re Prater, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969) The court explained that "reading a claim in light of the specification, to thereby interpret limitations explicitly recited in the claim, is a quite different thing from 'reading limitations of the specification into a claim,' to thereby narrow the scope of the claim by implicitly adding disclosed limitations which have no express basis in the claim." Thus, the claim is not limited to such interpretation and the rejection still holds.

As such, this action is made final.

Conclusion

2. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEITH COLEMAN whose telephone number is (571)270-3516. The examiner can normally be reached on 5:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Cronin can be reached on (571)272-4536. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KAC
/K. C./
Examiner, Art Unit 3747

/Mahmoud Gimie/
Primary Examiner, Art Unit 3747